

WHAT IS CLAIMED IS:

1. An optical signal amplifier comprising:

at least one source of pumping light, said source being configured to produce pumping light having a predominant polarization state;

5 at least one depolarizer comprising a birefringent optical component having a principal axis oriented at about 45 degrees with respect to said predominant polarization state and coupled to receive said pumping light as an input and having as an output a pumping beam, wherein said output pumping beam has a degree of polarization in an inclusive range of greater than 1% through approximately 40%; and

10 a Raman gain medium configured to receive said pumping beam and optical signals as inputs and to transfer energy from said pumping beam to said optical signals via stimulated Raman scattering.

2. The amplifier of Claim 1, wherein said Raman gain medium being a single mode optical fiber.

15 3. The amplifier of Claim 2, wherein said Raman gain medium being a single mode fiber that is forward pumped.

4. The amplifier of Claim 2, wherein said Raman gain medium being a single mode fiber that is backward pumped.

20 5. The amplifier of Claim 4, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 15%.

6. The amplifier of Claim 5, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 13%.

25 7. The amplifier of Claim 6, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 11%.

30 8. The amplifier of Claim 7, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 10%.

9. The amplifier of Claim 8, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 9%.

10. The amplifier of Claim 9, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 6% through 7%.

5 11. The amplifier of Claim 3, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 1% through 10%.

10 12. The amplifier of Claim 11, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 2% through 9%.

15 13. The amplifier of Claim 12, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 3% through 7%.

20 14. The amplifier of Claim 13, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 4% through 6%.

15. The amplifier of Claim 1, wherein said Raman gain medium being a non-zero dispersion shifted fiber.

16. The amplifier of Claim 15, wherein said Raman gain medium being a non-zero dispersion shifted fiber that is backward pumped.

25 17. The amplifier of Claim 16, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 20%.

30 18. The amplifier of Claim 17, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 16%.

19. The amplifier of Claim 18, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 12%.

20. The amplifier of Claim 19, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 8%.

21. The amplifier of Claim 20, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 7%.

22. The amplifier of Claim 21, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization of about 6%.

23. The amplifier of Claim 15, wherein said Raman gain medium being a non-zero dispersion shifted fiber that is forward pumped.

24. The amplifier of Claim 23, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 1% through 9%.

25. The amplifier of Claim 24, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 2% through 8%.

26. The amplifier of Claim 25, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 3% through 7%.

27. The amplifier of Claim 26, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 4% through 6%.

28. The amplifier of Claim 27, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of about 5%.

29. The amplifier of Claim 1, wherein said Raman gain medium being a dispersion compensation fiber that is forward pumped.

5 30. The amplifier of Claim 29, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 20%.

10 31. The amplifier of Claim 30, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 16%.

32. The amplifier of Claim 31, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 12%.

15 33. The amplifier of Claim 32, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 8%.

20 34. The amplifier of Claim 33, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 7%.

35. The amplifier of Claim 34, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization of about 6%.

36. A method of managing polarization dependent gain in a Raman amplifier comprising:

25 routing laser light having a predominant polarization state through a single birefringent component that has a principal axis oriented at about 45 degrees with respect to said predominant polarization state so as to produce a pumping beam which has a degree of polarization in an inclusive range of greater than 1% through about 40%; and

30 routing said pumping beam to a Raman gain medium.

37. The method of Claim 36, wherein said Raman gain medium being a single mode optical fiber.

38. The method of Claim 37, wherein said Raman gain medium being a single mode fiber that is forward pumped.

39. The method of Claim 37, wherein said Raman gain medium being a single mode fiber that is backward pumped.

40. The method of Claim 39, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 15%.

41. The method of Claim 40, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 13%.

42. The method of Claim 41, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 11%.

43. The method of Claim 42, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 10%.

44. The method of Claim 43, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 9%.

45. The method of Claim 44, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 6% through 7%.

46. The method of Claim 38, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 1% through 10%.

47. The method of Claim 46, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 2% through 9%.

48. The method of Claim 47, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 3% through 7%.

49. The method of Claim 48, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 4% through 6%.

50. The method of Claim 36, wherein said Raman gain medium being a non-zero dispersion shifted fiber.

51. The method of Claim 50, wherein said Raman gain medium being a non-zero dispersion shifted fiber that is backward pumped.

52. The method of Claim 51, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 20%.

53. The method of Claim 52, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 16%.

54. The method of Claim 53, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 12%.

55. The method of Claim 54, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 8%.

56. The method of Claim 55, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 7%.

57. The method of Claim 54, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization of about 6%.

58. The method of Claim 50, wherein said Raman gain medium being a non-zero dispersion shifted fiber that is forward pumped.

59. The method of Claim 58, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 1% through 9%.

60. The method of Claim 59, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 2% through 8%.

61. The method of Claim 60, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 3% through 7%.

62. The method of Claim 61, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of above 4% through 6%.

63. The method of Claim 62, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of about 5%.

64. The method of Claim 36, wherein said Raman gain medium being a forward pumped dispersion compensating fiber.

65. The method of Claim 64, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of greater than 1% through 20%.

66. The method of Claim 65, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 2% through 16%.



67. The method of Claim 66, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 3% through 12%.

68. The method of Claim 67, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 4% through 8%.

69. The method of Claim 68, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization in an inclusive range of 5% through 7%.

70. The method of Claim 69, wherein said depolarizer is configured to provide an output pumping beam that has a degree of polarization of about 6%.

71. (Amended) A light source for pumping a Raman gain medium in a Raman amplifier comprising:

a laser light source configured to produce an output light beam having a predominant polarization state;

a single birefringent component having an input port and an output port, wherein said input port is configured to receive said output light beam and having a principal axis oriented at about 45 degrees with respect to said predominant polarization state so as to produce a pumping beam which has a degree of polarization in an inclusive range of greater than 1% through about 40%, and wherein said output port is configured to couple said pumping beam to said Raman gain medium.

72. The light source of Claim 71, wherein said Raman gain medium being a single mode optical fiber.

73. The light source of Claim 72, wherein said Raman gain medium being a single mode fiber that is forward pumped.

74. The light source of Claim 73, wherein said Raman gain medium being a single mode fiber that is backward pumped.

75. The light source of Claim 71, wherein said Raman gain medium being a non-zero dispersion shifted optical fiber.

76. The light source of Claim 75, wherein said Raman gain medium being a non-zero dispersion shifted optical fiber that is forward pumped.



77. The light source of Claim 75, wherein said Raman gain medium being a non-zero dispersion shifted fiber that is backward pumped.

78. The light source of Claim 71, wherein said Raman gain medium being a dispersion compensating fiber that is forward pumped.